FINAL REPORT

BIOLOGICAL ASSESSMENT FOR LISTED AND PROPOSED THREATENED AND ENDANGERED SPECIES

CECIL MOSES MEMORIAL PARK TUKWILA, WASHINGTON

Prepared for
King County
Department of Construction and Facilities Management

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1.0 INTRODUCTION

Section 7 of the Endangered Species Act (ESA) of 1973, as amended, requires federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. In a letter dated October 7, 1999, the US Fish and Wildlife Service (USFWS) provided a list of listed, proposed, candidate, or species of concern that occur or may occur in the vicinity of the Cecil Moses Memorial Park project site. In a telephone confirmation on November 5, 1999, the National Marine Fisheries Service (NMFS) confirmed that Puget Sound Chinook and Coho Salmon needed to be addressed in the B.A. The USFWS letter is provided in Appendix 1.

This Biological Assessment (BA) was developed to examine how the proposed development at Cecil Moses Memorial Park may affect the species listed below. This BA evaluates potential impacts to these species from project implementation based upon existing information on the site's existing habitat conditions and suitability for providing the life history requirements of these species. The USFWS and NMFS identified the following listed, proposed, and candidate species.

Listed Species

Birds: Bald eagle (Threatened)

Fish: Puget Sound Chinook Salmon (Threatened)

Fish: Bull Trout Puget Sound/Coastal DPS (Threatened)

Candidate Species

Fish: Puget Sound/Strait of Georgia Coho Salmon

2.0 PROJECT LOCATION AND AFFECTED ENVIRONMENT

Cecil Moses Memorial Park (the Park) is located adjacent to the Duwamish River and West Marginal Place S. (Highway 99) in Tukwila, Washington (see legal description and figures in Appendix 2). The 3-acre Park is currently mostly undeveloped (a restroom and bike path are present) and was previously a residential area.

The Park is situated along the west bank of the Duwamish River and lies on the historic floodplain of the Duwamish River. Slopes are generally flat or slightly undulating and range from 0-5 percent. Historically the site probably included bottomland forest and scrub/shrub habitats intermixed with natural sloughs and estuarine wetlands. The Park site first was developed with residential lots. The hydrology of the site and its immediate vicinity may have been altered by filling activities in the early 1900s, and more recent bank stabilization efforts in the form of armoring the river bank with old tires to protect a sewer or water line at the south end of the Park. The project is now above the FEMA floodplain elevation.

Habitat types within the Park site consist of mowed lawn and a patch of forest/scrub-shrub vegetation adjacent to the Duwamish River. Some of the lawn and forest/scrub-shrub patch would be removed for construction of the proposed estuarine wetland. The forest/scrub-shrub

area is vegetated with a mixture of native and non-native plants. Native species identifiable during the November 3, 1999 site visit were horsetail, red alder, western red cedar, bigleaf maple, Douglas-fir, and snowberry. Scattered remnant ornamental plants including forsythia, camellia, Lombardy Poplar, black locust, weeping willow, English laurel, grapevines and cherries are also present. Non-native, invasive species present include bindweed, poison hemlock, reed canarygrass, orchardgrass, tall fescue, and Himalayan blackberry. Himalayan blackberry and horsetail appear to be the dominant species in the forest/scrub-shrub patch.

Wildlife species (or recognizable signs) observed on site on November 3, 1999 site visit include mole, cedar waxwing, American robin, European starling.

The Park experiences human disturbance because of the very heavily used Green River Trail, which extends along the west boundary of the Park.

3.0 PROJECT DESCRIPTION

The proposed project is illustrated in figures provided in Appendix 2. The Cecil Moses Memorial Park project involves development of a park by King County on an approximately 3-acre parcel of undeveloped land along the Duwamish River in Tukwila, Washington. The Green River Trail extends along the western boundary of the park (see figures in Appendix 2). The park will include a parking lot, benches, picnic tables, and paths as well as canoe/kayak river access. A restroom has already been constructed. A small area in the park near the Duwamish River will be developed as intertidal habitat and a site will be developed and dedicated for a Native American interpretive display. An irrigation system will be installed in the new park and new landscaping added. On-site drainage (parking lot and restroom roof drains) will be treated in a bioswale with Type I catch basins in the parking lot and on the downstream end of the bioswale prior to drainage outflow to the Duwamish River. Plans for the park have been submitted to the Corps of Engineers, the State Departments of Ecology and Fish and Wildlife, and the City of Tukwila as part of the permitting process.

The project consists of excavation of a portion of the Park to create an area of intertidal high marsh similar to an area that already exists across the Duwamish River in the same vicinity. Construction of the estuarine embayment will involve removal of approximately 6,000 to 6,500 cy of excavated material. Approximately 1,250 to 1,350 cy of material will be imported as primarily structural fill under the pathways and the parking lot. The equipment to be used will probably include a track-mounted excavator, a front end loader, dump trucks, and an angle dozer. The proposed estuarine area will be surrounded by a wood (post and rail) fence to limit physical access but allow visual access. Plantings will include deciduous and evergreen trees, shrubs, and groundcovers, as well as shrubs and grasses for the intertidal estuarine embayment as noted below (Chapter 5.0).

The purpose of the proposed action is to aid in local efforts to restore fish habitat and provide additional limited recreational access in the form of a dedicated canoe/kayak access to the Duwamish River. The project is also designed to provide interpretive information on the cultural and historic significance of this part of the Duwamish River. This proposed project has the support of the Washington Department of Fish and Wildlife and other agencies or organizations with an interest in rehabilitating the Duwamish.

4.0 ACTION AREA

The Action Area for all three listed species noted above includes the Park and extends across the Duwamish River to the opposite shore (see Figure in Appendix 2). This includes the area directly impacted by construction at the Park and the adjacent shoreline and the stream reach of the Duwamish River indirectly or potentially affected by construction or construction-related stormwater runoff, turbidity and sedimentation. This stream reach would extend from the project area to as far downstream as any short-term construction related increases in turbidity occur. The project area is in a high turbidity, tidally, influenced, low energy environment with considerable deposition. Any increase in turbidity is most likely to be of short duration and occur when a channel to the proposed estuarine area is opened in mid-December. The channel will be opened during a period of minimal tidal flow to minimize the velocity of water entering the newly constructed estuary basin. This will eliminate or reduce the potential for a short-term release of fine sediments into the Green River when the new estuary is first filled. With the exception of this brief period when there is a potential for increased turbidity downstream from the site, the action area will be confined to the area directly impacted by construction at the Park and the adjacent shoreline.

5.0 PLANTING PLAN

The plant type selection for the estuary was based on observation of plant varieties that exist in similar conditions in the local area, on research into salt- and inundation- tolerant species, as well as the preference by the Elliott Bay Duwamish Restoration Panel to have native, or nearly native, species within the estuary. The lower and upper limits of sedge planting (elevation 2.6 to 4.24 Mean High Water (MHW)), and the variety of sedge were determined by field verification of similar conditions on the opposite bank of the river. Plantings above the sedge, from 4.24 MHW to 5.2 Mean Higher High Water (MHHW) include salt-tolerant groundcover with jute netting to provide erosion control until the plants get established. Plantings on the slope above, from 5.2 MHHW to 8.9 Highest Tide include a variety of shrubs and groundcover that are native, or nearly native, and have some level of tolerance for salt water inundation (the lower the elevation, the more tolerant the plant variety). Above the Highest Tide level, the plantings include native, or nearly native, trees, shrubs and groundcover that is appropriate to a native riparian corridor. It is anticipated that some plant replacement may be required in the early years of monitoring the site, and that is provided for in the Monitoring Plan (Appendix 5). The plantings will be irrigated for a period of two years to increase survival rates overall. However, the desired result is that over time the estuary, and its plantings, will transform into a natural environment that will not require maintenance or intervention to develop into valuable habitat.

6.0 GENERAL IMPACTS OF THE PROPOSED ACTION

The anticipated impacts of the proposed project include the possibility of erosion and sedimentation occurring during project construction and dewatering. A temporary erosion control and sedimentation plan and other Best Management Practices (BMPs) will be in place prior to and during construction (see Appendix 2, Sheet D3), and dewatering will be controlled in accordance with Washington Department of Ecology approved measures for the appropriate water quality permit.

6.1 Increased Impervious Surface

The original use of this property was residential development and the existing street system with a cul-de-sac remains. Because the existing street will be removed to accommodate park improvements, the net increase of impervious surface will be minimal, approximately 13%.

- Total Area of Existing Asphalt to be removed: -1200 SY
- New Asphalt Parking Lot +615 SY
- New Asphalt Trails +540 SY
- New Concrete Paving +205 SY
- Net Increase in Impervious Surface +160 SY

  (13.3% increase over existing)

The existing street system drains to a catch basin and culvert and is piped to the river without benefit of water-quality improvement facilities, such as a biofiltration swale. The new parking lot (approximately half the size of the area of asphalt to be removed) shall have an oil-water separator and will be routed through a biofiltration swale before it enters the river. This will result in significantly less runoff, with fewer contaminants, entering the river through a single point discharge. The paved trails are pitched to drain to the lawn and shrub beds, thereby increasing percolation and decreasing runoff. Therefore, even with the minimal increase in actual impervious surface, the end result will be a reduction of single point discharge directly to the river. The direct and indirect effects to all listed species from this increase in impervious surface will be insignificant and discountable because the existing untreated runoff will be replaced with water-quality treatment facilities, such as a biofiltration swale and an oil-water separator. These treatment facilities combined with the design of paved trails to increase percolation of runoff from impervious surfaces will result in a reduction of the existing single point discharge into the river.

6.2 Construction Sequencing, Timing, And Schedule

6.2.1 Sequencing

Although the project includes construction of a new intertidal estuary directly connected to the river, the duration of work actually in the water is very short. This is due to the fact that the riverbank will be left undisturbed and construction of the estuary will take place behind the existing top of the bank. The elevation at the top of the bank ranges from approximately 10 to 17 feet (NGVD '29 datum). Although this portion of the river has not been engineered as a dike, the effective height is such that it has functioned as a dike for the residential homes that once existed behind and above the bank. The ordinary high water elevation is 4.4, MHHW is 5.2, 100-year flood elevation is 8.8, and highest tide is 8.9. Excavation and grading of the estuary, importation of rock, impervious soils, silts, sand and gravel will all take place with no disturbance riverward of the top of the bank, so there will be no danger of overtopping from high tides during this phase of construction.

Once the estuary construction is completed, and the banks are planted, work will focus on forming the lower reaches of the channel. The exact timing of this work will be approved by the engineer based on weather conditions and tidal extremes (see Section 6.2.2). This work shall start with reducing the height of the protective dike to "Temporary Berm" elevation (the elevation shown on the drawings is 12" above MHHW 5.2, but based on field conditions at the time of construction, may be higher). The top of the temporary berm will be high enough to prevent overtopping into the estuary for the remaining duration of work, which will be 3 to 5 days. At this time, the lower reaches of the channel shall be formed, sedge shall be planted, and the sedge protective fencing shall be installed. When this work is complete, and at a low tide, the temporary berm shall be removed and the remainder of the channel and gravel weir shall be formed and constructed.

This sequence of construction will assure the construction takes place behind a protective berm, and not actually in moving water, thus reducing the chance for sediments to enter the river.

6.2.2 Timing and Schedule

The construction window for this reach of the Duwamish is October 15 through March 15. During this time, there is minimal activity by the listed species in the river system. Effects on the listed species are discussed in Chapter 8.0. The Draft Construction Schedule (Appendix 2) assumes work will start at the opening of the construction window, on or about October 15th. The construction activities listed correlate with the sequence described above. The work behind the existing riverbank will continue until the first week in December, at which time the riverbank height will be reduced to temporary berm elevation. During the second week of December, and at low tide, the channel will be opened to the river.

Based on the low level of activity in the river by the listed species during mid-December to mid-January, this is the ideal schedule for construction. Adult chinook salmon have finished their migration and spawning activities by this time and adult coho salmon have migrated to their spawning grounds and tributaries and are not present in the project area. Migrating and foraging bull trout are most likely to be present during the spawning migration of adult salmon or when salmonid smolts are migrating downstream (mid-February through the end of June). Listed juvenile salmonids do not migrate downstream to rear in the vicinity of the project area until mid-February. The utilization of the Green River in the project vicinity by listed salmonids is at its lowest ebb between mid-December and mid-February. By opening the channel to the river during the period of lowest habitat utilization, possible behavioral effects to salmonids from any short-term increase in turbidity will be minimized. The Draft Construction Schedule is included in Appendix 2. The contractor's actual construction schedule shall be approved and adjusted at four points in the process. Initially, prior to the Notice to Proceed, again just before importation of materials into the estuary, a third time when the temporary berm elevation is to be established, and lastly, when the channel is to be opened to the river at low tide. This will assure that unforeseen circumstances that may result from fluctuating weather and river conditions are accounted for, and construction procedures can be modified before the next critical stage of work begins.

6.2.3 Protective Measures for Unanticipated Conditions

In the event that the river level is significantly higher than anticipated (due to above average rainfall or atypical adjustments to the dam) the contractor shall be required to have materials and equipment on site to protect the work area and minimize siltation into the river (see Section 6.3, Sediment and Erosion Control). As part of the erosion control measures, the contractor shall construct a settling pond in the location of the proposed biofiltration swale. At the low end of the pond a catch basin and pipe shall provide an outlet to the river. The settling pond shall have straw bales staked along its length to intercept silt and the catch basin will be covered with silt fence fabric to capture any remaining silt before it enters the pipe and the river. If, during construction, it is apparent that water levels will rise to overtop the temporary berm, sand bags shall be placed atop the berm to increase the effective height.

Once waters recede and the threat of overtopping is gone, the water remaining in the estuary shall be pumped into the settling pond where it will be filtered through straw bales and silt fence before entering the river. Excess silt in the estuary or the settling pond shall be excavated and disposed of off-site.

Even without the prospect of water overtopping the berm there may be periods during construction when groundwater will seep into the excavation. This same procedure of pumping water into the settling basin shall be employed in order to keep the estuary 'dry' and workable.

6.3 Sediment and Erosion Control

Before construction starts the contractor is required to (1) install specified sediment and erosion control facilities, (2) identify in the construction schedule a minimum schedule for checking, repairing and cleaning out facilities, and (3) place on site specified materials and equipment that are available for emergency situations.

6.3.1 Initial Installation of Facilities

The contractor shall install a rock construction entrance at the north end of the site before entering 27th Avenue South. Transport of dirt and mud off-site will be minimized because the existing asphalt road on site shall be left in place to the extent that the grading operation allows. The rock construction entrance will also function as a washpad for trucks and construction equipment. The drainage will flow directly into the upper end of the settling pond.

A silt fence shall be installed along the top of the bank and the limit of work shall be staked and approved. The staging area for construction shall be kept inside the limit of work, above the 100-year flood level of 8.8, and a minimum of 100' back from the top of the bank so as to retain as much natural vegetation between the work area and the river. The site is currently heavily vegetated with shrubs and grasses, which provides an ideal filter for any silt-laden run-off that may result from construction activity. No work will be permitted outside the flagged boundaries of the limit of work.

A settling pond shall be constructed at the north end of the site, where the future biofiltration swale is located. A catch basin and pipe out to the river with a riprap outfall shall be installed. The settling pond shall be hydroseeded with fast germinating grasses (such as an annual or

perennial rye applied at minimum 80 pounds per acre), lined with straw, and staked with straw bales at 25' intervals along its length. The pond will be used for handling runoff from the construction equipment washpad area, as well as filtering water pumped up from the estuary while it is under construction.

6.3.2 Schedule for Checking, Repair and Cleaning of Facilities

The contractor shall identify in his construction schedule when, at a minimum, facilities will be checked and cleaned. Under normal conditions, silt fences and catch basins shall be checked weekly, and after all storm events. In the event that heavier than normal rainfall is experienced, the contractor shall check all facilities several times daily, at high tide, low tide, and during periods of heavy rain. Repair shall be made immediately should the facility be damaged.

6.3.3 Protective Measures for Unanticipated Conditions

The contractor shall have the following materials and equipment on site to implement repairs of sediment and erosion control facilities as well as implement emergency procedures in the event that water overtops the temporary berm. The materials and equipment stored and available on site shall include:

- Straw bales
- Sand bags and a stockpile of approved soil (or imported sand) on site
- Bentonite
- Quarry spalls and crushed rock
- Filter fabric and stakes
- Submersible pump and hoses

Certain procedures shall be required to minimize potential for erosion on site and into the river. These include keeping stockpiled soil above the 100-year flood elevation and a minimum of 100' back from the top of the riverbank, minimizing the amount of stockpiled soil on site, and keeping it covered with plastic. Disturbance of natural vegetation shall be minimized by limiting the construction activity and haul route to the existing paved areas and to the west of the paved areas (where drainage is directed to the settling pond). Construction of the estuary shall take place behind the top of the bank, so there will be no natural flow from the excavated area directly to the river. Sediment will be confined to the area of the estuary. The freshly graded slopes of the estuary will have had time to settle and compact before the channel is opened and the slopes exposed to the river. The soils below MHHW level consist of finer grained materials that compact easily and are not susceptible to significant suspension when exposed to water. The only material being installed in the estuary that is subject to floating is the fine bark mulch which is being installed only above the MHHW level, where flows are infrequent. In addition, the estuary has been designed so the water flows past the site, so there are no strong channel velocities within the estuary itself. This will minimize turbidity in the estuary and downstream.

In the event that heavier than normal rain occurs during construction, protective measures shall be implemented. Some items of work, such as earthwork and importation of soils, shall be suspended until soils and conditions are workable. If the project area is to be left unworked for more than 12 hours, the exposed slopes shall be covered with straw (minimum 2" thick), erosion control fabric, plastic or an approved erosion blanket. Catch basins shall be checked daily to ensure that no more than one foot of sediment has accumulated. Sediment shall be removed from the catch basins and pipe and hauled off-site.

The probability of water overtopping into the work area is slight because historically, the riverbank elevation has provided effective flood control for the houses that were located at the top of the bank during recent 100-year events. The initial work, which includes excavation of the estuary, installation of irrigation, rock, topsoil, plants, and impervious soils shall all be done without disturbance to the existing riverbank. The river level is controlled to a greater extent than most because of the Howard Hanson Dam at its upper reaches. Upon completion of this initial work, the riverbank elevation shall be lowered at the mouth of the new estuary to create a temporary berm, the elevation of which shall be determined by the river and weather conditions. The tidal cycles and levels are known, so the only variables are the activity at the Dam and the rainfall, both of which can be fairly accurately evaluated for the short period of time remaining for construction – approximately one week.

If by some chance overtopping does occur, it will not happen without some advance warning. In that time, the contractor shall build up the temporary berm elevation with sand bags to minimize the amount of overtopping. After waters subside, the trapped water inside the estuary shall be pumped out into the settling pond and excess silts and debris shall be excavated and dumped off-site.

6.4 Estuary Pooling at Low Tide

The estuary is designed with a sand and gravel weir across the mouth that maintains a pool inside the estuary even at low tide when the rest of the estuary is 'dry'. The purpose of this pool is to sustain the hydrology needed to maintain a healthy stand of sedge on the 'floor' of the estuary. If the estuary were graded to drain completely at low tide, the zone that sedge would flourish in would be significantly smaller, the habitat value would be minimal, and there would be a greater likelihood of invasive plant material filling in the area just above the sedge. If the estuary were graded flat, at the correct levels for sedge growth, there would be a greater possibility of more, smaller and shallower pools forming on the estuary floor. This scenario would increase the likelihood of fish kill from thermal extremes.

The pool, as designed, will be approximately 3-4' deep and will be separated from the river for a period of 4 to 6 hours twice a day on average. One of the diurnal tides, under extreme conditions may cause separation up to 10 hours. There will be a regular exchange of water with incoming tides, so there is little likelihood of stranding juvenile chinook and coho salmon fish in the pool for a period of time that would be detrimental to their health. There will be protective cover (large woody debris) in the estuary that will provide shade and hiding places for juvenile salmon. Because most of the large wood debris will be positioned in the deepest portion of the estuary, juvenile salmonids present in the estuary during low tides will concentrate in the deepest water where water quality conditions (temperature and dissolved oxygen) will be adequate to sustain

them until the estuary refills. Concentrating large woody debris in the deepest water of the estuary will also provide the cover essential to prevent or minimize bird predation of juvenile salmonids during low tides.

7.0 METHODS

No new studies were conducted in preparation of this Biological Assessment. Information used to determine potential use of the project site by the species listed above include a search of existing literature and consultation with resource agency personnel and private biologists who have knowledge of the area. The site was visited by a biologist/ecologist in early November of 1999, who recorded the plant and animal species observed at the site and characterized the habitat present.

The NMFS report entitled "A Guide to Biological Assessments" (1999) and the King County Section 7 Assessment Form – Part 1 (1999) procedures were followed. These items are included in Appendices 3 and 4, respectively of this document. Also included as Appendix 5 is the Intertidal Habitat Projects Monitoring Program prepared by the USFWS for the Elliott Bay/Duwamish Restoration Program.

8.0 RESULTS

8.1 Bald Eagle (Haliaeetus leucocephalus)

8.1.1 Life History and Use of The Site

The bald eagle is listed as Threatened by the USFWS and is currently being considered for delisting through most of its range. Bald eagles may winter in the vicinity of the Park, and may be present between October 31 and March 31 (USFWS letter dated September 27, 1999). Wintering bald eagles forage on fish and waterfowl/waterbird carcasses, and may also actively hunt fish and waterfowl/waterbirds on local waterways.

Bald eagles will forage up to 20 miles from their roost or nest site (Isaacs, pers. com. 1999). Typically, wintering bald eagles associate with large concentrations of waterfowl, feeding on injured or dead geese (Griffin et al. 1982), or areas where salmon spawn (Stalmaster 1987).

The nearest known bald eagle nest is over 1 mile from the Park. Eagles do forage along the Green River and the Duwamish (Nagri 1999). Foraging eagles typically roost in trees adjacent to rivers looking for fish and/or waterbirds. There are no existing trees adjacent to the Duwamish River within the Park that are suitable for eagle roosting. Such roost trees are typically large cottonwoods, bigleaf maples, or Douglas-firs with open structure and bare limbs that can be accessed by eagles.

8.1.2 Determination of Effects

Suitable nesting sites are lacking within the project site. The trees on the project site lack the size and placement for preferred nest sites. No known bald eagle nesting sites have been

identified within the project site or in the near vicinity. Foraging opportunities are provided by wintering concentrations of waterfowl on the Duwamish River, within open water or ponded wetlands near (but not within) the project site, although the level of human disturbance is moderate due to the presence of the Green River Trail and Bridge within and adjacent to the Park.

Project implementation may result in some short-term disturbance or displacement of individual foraging bald eagles within the project site and immediate vicinity during construction. Construction of the proposed estuarine embayment would provide additional potential foraging habitat for bald eagles, as the embayment is expected to attract waterbirds and fish. The use that would be made of this habitat, however, may be limited by increased human use of the Park. No negative long-term impacts would result to the Puget Sound and Duwamish River wintering or nesting populations of bald eagles.

It appears that minor positive and no negative long-term effects are likely to occur to bald eagles from this project. We conclude that there would be no effect to bald eagles from this project.

8.2 Puget Sound Chinook Salmon (Oncorhynchus tshawytscha)

8.2.1 Life History and Use of The Site

The chinook salmon that migrate upstream and downstream in the Duwamish River, past the Park, belong to the Puget Sound Evolutionarily Significant Unit (ESU) of the species. The Puget Sound ESU comprises coastal basins of the eastern part of the Strait of Juan de Fuca, Hood Canal, and Puget Sound. This ESU includes spring, summer, and fall run fish. Puget Sound fish tend to mature at 3 to 4 years of age and are not recovered from Alaskan waters to the same extent as those from the Washington Coast ESU. Marine recoveries of fish from the Green River were made only in Canadian and Puget Sound waters.

Puget Sound chinook remain relatively abundant; however, much of the production is from hatcheries. The overall trend in abundance is predominantly downward. Several populations are showing severe short-term declines. Spring-run chinook in this ESU are depressed. There is concern that the high level of hatchery production is masking severe declines in wild fish. Spawning and rearing habitat in many areas are severely degraded, and access to many areas of habitat is restricted or blocked. NMFS concluded that this ESU is likely to become endangered in the foreseeable future (Myers et al. 1998).

Myers et al. (1998) provide a summary of run and spawning timing, based on Washington Department of Fisheries (WDF) et al. (1993) data for the Green River, which lies upstream of the Duwamish River. According to Myers et al. (1998), adult fall-run fish migrate upstream during the latter part of August and the early part of September, and spawn from early September through the end of November with peaks in September/October. WDF (1975) indicates that chinook spawn over approximately 33 miles of river, from the City of Tacoma water diversion downstream to the vicinity of Kent, with the most intensive spawning below Green River Gorge near Flaming Geyser Park and downstream 19 miles to the Auburn area. Adults do not feed during migration. The WDF (1975) describe the chinook runs in the Duwamish/Green River system as comprised principally of fall-run fish, with only very limited numbers of spring and

summer run fish present and spawning mostly in the upper gorge area of the Green River. Juveniles rear throughout the accessible part of the Green River and tributaries utilized by spawning adults. Early rearing also occurs in the lower Duwamish and Elliot Bay, and was identified by WDF (1975) as an extremely important and critical area. The WDF (1975) report that summer-fall chinook runs enter the lower river as early as June, and remain in the system through early November, with spawning occurring between mid September and early November. The juvenile rearing period is late January through mid-July, and outmigration early April through mid-July. Juvenile chinook are present in the Duwamish estuary from mid-February through early September with the peak in mid to late May (Warner and Fritz 1995). Adults do not feed during migration.

Hatchery rearing of fall-run chinook is common in Puget Sound and these hatchery fish were derived from a variety of watersheds within and outside the Puget Sound Region. There are currently three hatcheries operating on the Green River. WDFW operates the Icy Creek Pond and Green River Hatcheries and the Muckleshoot Tribe operates the Keta Creek Hatchery. The Green River fall-run chinook salmon stock has been the dominant hatchery stock in the Puget Sound ESU since the hatchery was opened in the early 1900s. This hatchery stock has been widely released into other watersheds in Puget Sound. A fairly large proportion of natural spawners in the system are hatchery-reared fish (WDF et al. 1993).

Myers et al. (1998) indicate that most of the Puget Sound ESU chinook migrate to the ocean as subyearlings. WDF (1975) also states that juvenile fall chinook remain in the river for about three months before migrating to the sea, but in contrast, state that spring chinook juveniles remain for a year prior to migrating to sea, usually between early April and mid-July.

The estuaries associated with local rivers are important rearing areas for these smolt. Smolt feed on a variety of invertebrates and small fish during their downstream migration.

8.2.2 Determination of Effects

Indicators for documented environmental baseline and project effects are evaluated using the criteria in the NMFS (1998) matrix framework. The summary matrix is provided in Appendix 3.

Diagnostic: Water Quality

Indicator: Temperature

Not Properly Functioning. High water temperatures in the Green River below RM 30 are cited by Bishop and Morgan (1996). The proposed project will not have a measurable effect on the temperatures of the Duwamish at or in the vicinity of the project site, and therefore is not expected to have an adverse effect on chinook salmon.

Indicator: Sediment

Not properly functioning. The high density of roads throughout the watershed, and high proportion of private timberlands in the upper basin continue to generate high sediment loads in the Duwamish/Green River system (Bishop and Morgan 1996). The proposed project will be excavated and planted before it is connected to the Duwamish River, and standard erosion control methods will be employed. Minor short-term impacts to water quality from construction

could result, although impacts would be minimal because appropriate erosion control methods will be employed (see Appendix 2, Sheet D3). The project may cause slight, temporary increases locally in sediment when the barrier between the River and embayment is removed, but this is not expected to have an adverse effect on chinook salmon.

Indicator: Chemical contamination/nutrients

Not properly functioning. There are high levels of contamination originating from industrial sources upstream. There is a CWA 303(d) designated reach adjacent to the project site, and over 30 other reaches elsewhere in the basin, including areas upstream and downstream of the project site according to the Washington Department of Ecology 303(d) list published on the DOE website. The proposed project would not affect this indicator.

Diagnostic: Habitat Access

Indicator: Physical Barriers

Not properly functioning. The Duwamish/Green River formerly drained 1,642 sq mi. It now drains only 483 sq mi due to human actions. The Tacoma water diversion and Howard Hanson dams block access to approx. 107 miles of historic habitat (Bishop and Morgan 1996). The proposed project will not affect physical barriers.

Diagnostic: Habitat Elements

Indicator: Substrate Embeddedness in Rearing Areas

Not properly functioning. The Lower Duwamish likely has a silt substrate that has over 30 percent embeddedness. The proposed project will not affect this characteristic.

Indicator: Large Woody Debris

Not properly functioning. The lower Duwamish has been subject to channelization, rip-rap-hardened banks and loss of riparian vegetation which has caused a lack of Large Woody Debris (LWD). Timber harvest in the upper basin has removed much of the large conifer logs in the riparian zone that would otherwise be recruited into the system. The proposed project will not affect LWD, except that possibly the new embayment may trap some logs during floods, and enhance habitat as a result.

Indicator: Pool Frequency and Quality

Not properly functioning. The Lower Duwamish historically was comprised of rapidly shifting meanders, and is now almost completely within dikes. Pools in lower reaches were eliminated (Bishop and Morgan 1996), and this reach does not meet the values in "functioning appropriately" in the matrix. The proposed project will not have an effect on pool frequency and quality in the Duwamish.

Indicator: Large Pools

Same as above under Pool Frequency and Quality

Indicator: Off-channel Habitat

Not properly functioning. The Lower Duwamish estuary has lost all of its original tidal swamp, and most of its mudflats and tidal marsh (99% reduction). Most of the estuary shoreline is

bulkheads, riprap, or pilings (Warner and Fritz 1995, Bishop and Morgan 1996) at present. The proposed project would restore a small area of tidal marsh and therefore provide additional off-channel habitat for chinook salmon to use.

Indicator: Refugia

Not properly functioning. Adequate habitat refugia do not exist in the Duwamish/Green system. The proposed project would not affect this indicator.

Diagnostic: Channel Condition & Dynamics

Indicator: Average Wetted Width/Maximum Depth Ratio

Not properly functioning. The Duwamish has been so severely altered from its original condition given its urban environment that it is very unlikely to have a natural ratio of this indicator. The proposed project will not affect the Duwamish channel condition.

Indicator: Streambank Condition

Not properly functioning. Most of the estuary shoreline is bulkheads, riprap, or pilings (Warner and Fritz 1995, Bishop and Morgan 1996) at present. Although this shoreline may be stable, it does not seem to be consistent with the intent of the definitions given in the matrix. Bishop and Morgan (1996) indicate intense timber harvest and high road density in the upper watershed, which is likely to have <80 % in stable banks. The proposed project will not affect streambank conditions, except for the natural vegetation that will be planted around the shoreline of the proposed embayment.

Indicator: Floodplain Connectivity

Not properly functioning. The lower Duwamish has severely reduced hydrologic connectivity according to Bishop and Morgan (1996), mostly as a result of urban development, which has included extensive encroachment, filling, and development in the floodplain, and elimination of nearly all natural estuary areas. The proposed project would provide a slight increase in flood storage as a result of the excavation, and reconnect a small area of floodplain to the River.

Diagnostic: Flow/Hydrology

Indicator: Change in Peak/Base Flows

Not properly functioning. There are reduced mainstem instream flows year round and in the spring due to Corps and City of Tacoma reservoir operation (Bishop and Morgan 1996). The proposed project would have no effect on flows.

Indicator: Increase in Drainage Network

Not properly functioning. There has been a significant increase in drainage network density due to roads (Bishop and Morgan 1996). This will not be affected by the proposed project.

Diagnostic: Watershed Conditions

Indicator: Road Density & Location

Not properly functioning. There are many valley bottom roads in this urbanized area of the River. The proposed project will not affect road density.

Indicator: Disturbance History

Not properly functioning. For the entire watershed, there is >15% Equivalent Clearcut Acres (ECA), and disturbance throughout. The Late Successional Old Growth (LSOG) retention percentage is unknown. The proposed project will not affect this indicator.

Indicator: Riparian Conservation Areas

Not properly functioning. The riparian reserve system is severely impacted (Bishop and Morgan 1996). The proposed project will not affect this indicator.

Indicator: Disturbance Regime

Not properly functioning. The urbanization of the lower river system, and private timber harvest in the upper system mean that natural processes are unstable. Land use changes and removal of forest cover in developed areas produce variations in flows characteristic of urban watersheds in Puget Sound. The proposed project will provide a small benefit to chinook salmon by restoring a small amount of estuary.

The dichotomous key for making ESA determination of effects (USFWS 1998a) is followed below:

- There are proposed/listed species
- The proposed action would have an effect
- The proposed action does not have the potential to hinder attainment of relevant "functioning appropriately" indicators
- There is a negligible probability of take or destruction/adverse modification of critical habitat
- Therefore, it is concluded that this project may affect, but is not likely to adversely affect chinook salmon.

8.3 Puget Sound/Strait of Georgia Coho Salmon (Oncorhynchus kisutch)

8.3.1 Life History and Use of The Site

The Puget Sound/Strait of Georgia ESU includes Coho from Puget Sound drainages, including the Duwamish/Green River system. Fish from this ESU are considered to be Candidates by the NMFS, meaning that there is concern that if present trends continue, Coho in this ESU are likely to become endangered in the foreseeable future. This is the NMFS position even though current population is near historic levels and the overall trend in abundance is not downward. There is substantial uncertainty about several risk factors, including widespread hatchery production, high harvests, habitat degradation, a recent decline in adult size, and unfavorable ocean conditions (Weitkamp et al. 1995).

Most Coho adults in the Puget Sound area return as 3-year-olds, having spent approximately half of their lives in fresh water and half in salt water. Smolt from the Green River migrate downstream in February through June, with peak numbers occurring between late April and early

May. This February –June period would therefore be the time when smolt would be present in the vicinity of Cecil Moses Memorial Park. Most smolt are between 90 to 115 mm in length at the time of outmigration. Smolt do feed on their journey out to sea. Returning adults enter the Green River system in late September through early November. Returning adults would be unlikely to be present for long in the Park vicinity, and also do not tend to feed during their upstream migration.

Recoveries of Coho released from hatcheries in the Puget Sound area are almost all either from the Washington and British Columbia Coast. Much of the hatchery stock still raised in Puget Sound was derived from the Green River Coho stock, as is also the case for Chinook salmon. There are naturally spawning Coho in the Green River. Approximately half of these spawning fish are of first-generation hatchery stock (Cropp pers. comm. 1999), which were originally derived from Green River stock.

8.3.2 Determination of Effects

Much of the original estuarine habitat that existed along the lower Duwamish River has been filled since European settlement. There may be minor short-term impacts from sediment released from the construction of the proposed estuarine marsh, although these should be minimal if appropriate erosion control methods will be employed (see Appendix 2, Sheet D3). Coho salmon are very unlikely to be adversely affected by the short-term construction impacts of the proposed project. The in-water construction could be scheduled to take place in July and August to avoid the times when coho are likely to be present in the system. Outmigrating smolts would benefit over the long term from the additional habitat that will become available as a result of this project. This habitat could be used by smolt for feeding and adapting to salt water conditions during their outmigration. Therefore we conclude that this project may affect, but is not likely to adversely affect coho salmon.

8.4 Bull Trout (Salvelinus confluentus)

8.4.1 Life History and Use of The Site

Bull trout (Coastal-Puget Sound Distinct Population Segment) were listed as Threatened by the U.S. Fish and Wildlife Service on November 1, 1999. This proposed listing includes populations in the Coastal-Puget Sound area of northwestern Washington, which would include the Green/Duwamish River system. According to the Washington Department of Fish and Wildlife [WDFW] (1992, 1996), anadromous, fluvial, lacustrine, and stream resident populations of bull trout are found in drainages extending from the Chehalis River to the Canadian Border. Distinguishing between Bull Trout and Dolly Varden in the field is difficult, and they are managed as a single native char species by WDFW. Bull trout require very cold, clean water and are currently restricted in range to the upper portions of the tributaries of Puget Sound. They are therefore vulnerable to any activities that cause warming of waters used for spawning and rearing. Population declines have been attributed to habitat degradation from land use practices such as logging, grazing, urbanization, industrial development, roads, agricultural diversions, other dams and diversions, competition, and predation by non-native fish (McIntosh et al. 1994,

Wissmar et al. 1994). Competition and hybridization with brook trout (*Salvelinus fontinalis*) and other introduced species threaten some populations. The migratory populations leave tributary streams and move to lakes, rivers, or salt water. Migratory corridors used by bull trout are threatened by flood control structures, dams, and water diversions. Bull trout in the Duwamish system are likely migrants or strays. According to Cropp (pers. comm. 1999), there is no suitable habitat available for spawning and rearing of bull trout in the upper Green River system, and any fish found in the system are likely migrants passing through from other areas. Small bull trout eat terrestrial and aquatic insects. As they grow, bull trout feed on other fish, including whitefish, sculpins, other trout, and salmon eggs,.

Bull trout therefore appear to be very uncommon and may occur only as transients in the vicinity of the proposed project.

8.4.2 Determination of Effects

Indicators for documented environmental baseline and project effects are evaluated using the criteria in the USFWS' (1998) matrix framework. The summary matrix is provided in Appendix 4.

Diagnostic: Subpopulation Characteristics

Indicator: Subpopulation Size

It is probable that the subpopulation is functioning at unacceptable risk. The proposed project will not affect any of the factors affecting bull trout spawning, rearing, or survival as adults. Since less than a dozen fish identified as bull trout have been reported in the Duwamish/Green River system in the last 50 years, the population size appears to be very small, probably less than 50 adults. In addition, it is questionable as to whether suitable spawning and rearing habitat now exists in the system, and fish in the Duwamish/Green River system may have originated from other streams tributary to Puget Sound. Spawning and rearing habitat, if it exists, would be in the upper, coldest reaches of the system, and will not be affected by the proposed project. The construction of an embayment, which will attract prey for adult bull trout, might provide additional foraging opportunities for any bull trout that are present.

Indicator: Growth and Survival

Probably functioning at risk or may be functioning at unacceptable risk; this is difficult to assess due to the lack of records of the species. The proposed project is considered to have no adverse effect on growth and survival of bull trout that may be present; the proposed embayment may provide additional foraging habitat for bull trout. The status of the current population of bull trout is unknown but apparently very low. It is questionable as to whether suitable spawning and rearing habitat is either present or accessible to bull trout in the Green/Duwamish system. Since so few bull trout have been recorded in the system, and surveys for the Plum Creek Timber Company HCP found no bull trout, if there is a population present is appears to be very small, and possibly comprised of migrants from other streams draining into Puget Sound. Such a population would be considered at least unlikely to recover from disturbance in 5 years, and may be undergoing rapid declines; however, there is very little data available.

Indicator: Life History Diversity and Isolation

This population is probably functioning at risk, and probably comprised of only migratory forms from other watersheds. The proposed project will not affect life history diversity and isolation. Given the questions regarding the presence and quality of spawning and rearing habitat, and the fact that fish from other streams draining into Puget Sound could easily enter the Duwamish/Green River system and remain there; the migratory form is probably the only one present. The correlation between this subpopulation and others is unknown. The proposed project will not have any impacts on this aspect of the species.

Indicator: Persistence and Genetic Integrity

Probably functioning at risk. The proposed project would not affect this indicator. Fish originating from other stream systems would have access to the Green/Duwamish system; source populations have not been identified, and displacement by competitors is possible. Creation of the proposed embayment would not have an effect, except possibly to enhance potential food supply.

Diagnostic: Water Quality

Indicator: Temperature

Probably functioning at unacceptable risk. High water temperatures in the Green River below RM 30 are cited by Bishop and Morgan (1996). The proposed project will not have a measurable effect on the temperatures of the Duwamish at or in the vicinity of the project site, and therefore is not expected to have an adverse effect on bull trout.

Indicator: Sediment

Functioning at unacceptable risk. The high density of roads throughout the watershed, and high proportion of private timberlands in the upper basin continue to generate high sediment loads in the Duwamish/Green River system (Bishop and Morgan 1996). The proposed project will be excavated and planted before it is connected to the Duwamish River, and standard erosion control methods will be employed. Minor short-term impacts to water quality from construction could result, although impacts would be minimal because appropriate erosion control methods will be employed (see Appendix 2, Sheet D3). The project may cause slight, temporary increases locally in sediment when the barrier between the River and embayment is removed, but this is not expected to have an adverse effect on bull trout, since they are so rarely encountered in the system.

Indicator: Chemical contamination/nutrients

Functioning at unacceptable risk. There are probably high levels of contamination originating from industrial sources upstream. There is a CWA 303(d) designated reach adjacent to the project site, and over 30 other reaches elsewhere in the basin, including areas upstream and downstream of the project site according to the Washington Department of Ecology 303(d) list published on the DOE website. The proposed project would not affect this indicator.

Diagnostic: Habitat Access

Indicator: Physical Barriers

Functioning at unacceptable risk. The Duwamish/Green River formerly drained 1,642 sq mi. It now drains only 483 sq mi due to human actions. The Tacoma water diversion and Howard Hanson dams block access to approx. 107 miles of historic habitat (Bishop and Morgan 1996). The proposed project will not affect physical barriers.

Diagnostic: Habitat Elements

Indicator: Substrate Embeddedness in Rearing Areas

Functioning at unacceptable risk. The Lower Duwamish likely has a silt substrate that has over 30 percent embeddedness. The proposed project will not affect this characteristic.

Indicator: Large Woody Debris

Functioning at unacceptable risk. The lower Duwamish has been subject to channelization, rip-rap-hardened banks and loss of riparian vegetation which has caused a lack of LWD. Timber harvest in the upper basin has removed much of the large conifer logs in the riparian zone that would otherwise be recruited into the system. The proposed project will not affect LWD, except that possibly the new embayment may trap some logs during floods, and enhance habitat as a result.

Indicator: Pool Frequency and Quality

Functioning at unacceptable risk. The Lower Duwamish historically was comprised of rapidly shifting meanders, and is now almost completely within dikes. Pools in lower reaches were eliminated (Bishop and Morgan 1996), and this reach does not meet the values in "functioning appropriately" in the matrix. The proposed project will not have an effect on pool frequency and quality in the Duwamish.

Indicator: Large Pools

Same as above under Pool Frequency and Quality

Indicator: Off-channel Habitat

Functioning at unacceptable risk. The Lower Duwamish estuary has lost all of its original tidal swamp, and most of its mudflats and tidal marsh (99% reduction). Most of the estuary shoreline is bulkheads, riprap, or pilings (Warner and Fritz 1995, Bishop and Morgan 1996) at present. The proposed project would restore a small area of tidal marsh and therefore provide additional off-channel habitat for bull trout to use.

Indicator: Refugia

Functioning at unacceptable risk. Adequate habitat refugia do not exist in the Duwamish/Green system. The proposed project would not affect this indicator.

Diagnostic: Channel Condition & Dynamics

Indicator: Average Wetted Width/Maximum Depth Ratio

Functioning at unacceptable risk. The Duwamish has been so severely altered from its original condition given its urban environment that it is very unlikely to have a natural ratio of this indicator. The proposed project will not affect the Duwamish channel condition.

Indicator: Streambank Condition

Functioning at unacceptable risk. Most of the estuary shoreline is bulkheads, riprap, or pilings (Warner and Fritz 1995, Bishop and Morgan 1996) at present. Although this shoreline may be stable, it does not seem to be consistent with the intent of the definitions given in the matrix. Bishop and Morgan (1996) indicate intense timber harvest and high road density in the upper watershed, which is likely to have <80 % in stable banks. The proposed project will not affect streambank conditions, except for the natural vegetation that will be planted around the shoreline of the proposed embayment.

Indicator: Floodplain Connectivity

Functioning at unacceptable risk. The lower Duwamish has severely reduced hydrologic connectivity according to Bishop and Morgan (1996), mostly as a result of urban development, which has included extensive encroachment, filling, and development in the floodplain, and elimination of nearly all natural estuary areas. The proposed project would provide a slight increase in flood storage as a result of the excavation, and reconnect a small area of floodplain to the River.

Diagnostic: Flow/Hydrology

Indicator: Change in Peak/Base Flows

Functioning at unacceptable risk. There are reduced mainstem instream flows year round and in the spring due to Corps and City of Tacoma reservoir operation (Bishop and Morgan 1996). The proposed project would have no effect on flows.

Indicator: Increase in Drainage Network

Functioning at unacceptable risk. There has been a significant increase in drainage network density due to roads (Bishop and Morgan 1996). This will not be affected by the proposed project.

Diagnostic: Watershed Conditions

Indicator: Road Density & Location

Functioning at unacceptable risk. There are many valley bottom roads in this urbanized area of the River. The proposed project will not affect road density.

Indicator: Disturbance History

Functioning at unacceptable risk. For the entire watershed, there is >15% ECA, and disturbance throughout. The LSOG retention percentage is unknown. The proposed project will not affect this indicator.

Indicator: Riparian Conservation Areas

Functioning at unacceptable risk. The riparian reserve system is severely impacted (Bishop and Morgan 1996). The proposed project will not affect this indicator.

Indicator: Disturbance Regime

Functioning at unacceptable risk. The urbanization of the lower river system, and private timber harvest in the upper system mean that natural processes are unstable. Land use changes and removal of forest cover in developed areas produce variations in flows characteristic of urban watersheds in Puget Sound. The proposed project will provide a small benefit to bull trout by restoring a small amount of estuary.

Diagnostic: Species and Habitat

Indicator: Integration of Species and Habitat Conditions.

Functioning at unacceptable risk. This is assumed, given the degraded nature of the lower Duwamish. There is so little information available on bull trout in the system that this condition is assumed by default.

The dichotomous key for making ESA determination of effects (USFWS 1998a) is followed below:

- There are proposed/listed species
- The proposed action would have an effect
- The proposed action does not have the potential to hinder attainment of relevant "functioning appropriately" indicators
- There is a negligible probability of take or destruction/adverse modification of critical habitat
- Therefore, it is concluded that this project may affect, but is not likely to adversely affect bull trout.

8.5 Plants

The Natural Heritage Database had no records of listed plants within a 5-mile radius of the proposed project site. Two Federally-listed species have been recorded in King County: swamp sandwort (*Arenaria paludicola*, Endangered), and golden paintbrush (*Castilleja levisecta,* Threatened). Both species are known only from historic records and have not been observed in King County in recent times. The habitat for swamp sandwort is described by Hitchcock and Cronquist (1973) as swampy places, mostly along the coast, from the Tacoma "prairies" south to California. There is no such habitat present in the Park. The habitat for golden paintbrush is described by Meinke (undated) as gravelly prairies at low elevations, generally where damp in the winter but not with standing water. There is also no such habitat present in the Park. The possibility that either of these two plant species occur at the Park is extremely small, given its disturbed condition and history of use. We therefore conclude that this project would have no effect on listed plants.

9.0 CONSERVATION MEASURES

The project will be designed to meet water and air quality standards established by the local, state, and federal permitting agencies. Some of the required permits include the federal U.S. Army Corps of Engineers (COE) Section 404 permit and Department of Ecology Section 401 Water Quality Certification, Shorelines, and Hydraulic Approvals, as well as other City of Tukwila permits. Appendix 5 includes an Intertidal Habitat Projects Monitoring Program.

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